

# Software Development

(C, C++, Python, Core Java & SQL)

Software Development courses offered learners with knowledge on programming expertise; ways to solve complex problems by writing computer programs; systematic ways to read and write the code; understanding of computing processes at a deep level; advance of algorithms and object-oriented software.

**Duration:** 6 Month

## Job Prospects

Software Development has a very good career like opportunities in different field like software development, Web Portal etc.

## Job Profiles

- Software Developer
- Junior Programmer
- Programming Architect
- Web Developer

## Course Content

### Introduction to 'C'

- What is Language & History of 'C'.
- 'C' language Environment

### Basics of 'C' Language

- Identifiers in 'C'
- Variables and Datatypes
- Storage Classes
- Constants and Literal Constant
- printf , scanf, gets, puts
- Input and Output Instructions

### Operators

- Expressions and Arithmetic Operators
- Relational and Logical Operators
- Bitwise Operators
- Conditional Operator
- Ternary Operator

### Decision Making Statements

- If Statement
- If-else Statement
- Nested If
- If-else-if ladder
- Multiple if
- Switch Statement
- Nested switch
- Unconditional Branching using got statement

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## Control Statements (Loops)

- For loop
  - Nested for loop
- While Loop
  - Nested while
- Do-while loop
  - Nested do-while
- Break and Continue

## Array in 'C'

- Introduction to Array
- One-D array
- 2-D array
- Array addition, subtraction and multiplication
- Array sorting
- String Array

## Pointers & String

- Pointer
- Pointer with string

## Functions in 'C'

- Introduction and Writing Functions
- Types of function
- Array with function
- Array as an argument

## ENUM

### Structure

- About Structure
- Nested structure
- Structure with function
- Pointer with structure
- Structure as Parameter

### Union

### File Management

- Creation of own library header files

### Preprocessor

- Preprocessor directive #define macro
- Preprocessor directive typedef

### Dynamic Memory Allocation

- malloc(), calloc(), free() and realloc() etc.

### Stream in 'C'

- Reading file
- Writing file
- Appending file
- Retrieving cursor position

- Set cursor position
- Rewind cursor
- Pointer with function
- Call by value and call by reference
- Recursive function
- Formatted function with difference
- File Handling with Formatted and Unformatted Function

### Introduction to 'C++'

- History of 'C++'.
- 'C++' language Environment

### Language Features

- About Polymorphism, Encapsulation, Abstraction, Inheritance
- Difference and Similarities between C and C++
- Variables Declaration
- Function overloading
- Optional Parameters
- Reference Variables
- Operator overloading
- Basics of Console Input and Output
- Constant Pointers
- Dynamic Memory Allocation
- Role of Compilers and Assemblers

### Introduction to C++ Buzzwords Flow

#### Control Statements OOPs Concepts

- Overview of OOPs Principles
  - Oops vs. Procedural Programming Approach
  - Oops Implementation & Approaches
- Introduction to classes & objects
- Creation & destruction of objects
- Data Members
- Member Functions
- This Pointer
- Constructor & Destructor
- Static class member
- Friend class and functions

#### Encapsulation

#### Polymorphism

- What is Polymorphism
- Virtual functions
- Pure virtual functions
- Virtual Base Class
- Nesting of Class (i.e., Outer Class, Inner Class, Local Class) Polymorphism
- Function Overloading
- Constructor & Destructor
- Operator Overloading
- Function Overriding

#### Inheritance

- Introduction and benefits

- Access Specifier.
- Base and Derived class Constructors
- Types of Inheritance.
  - Single Inheritance
  - Multiple Inheritance
  - Multilevel Inheritance
  - Hierarchical inheritance
  - Hybrid Inheritance
- Down casting and up casting.
- Function Overriding
- Need of Virtual Function
  - Virtual Function
  - Pure Virtual Function
- Destructor overriding
- Binding Types
  - Static Binding
  - Dynamic Binding
- Abstraction
  - Data Abstraction
  - Abstract Class
- Pointers in C++
- Inline Functions
- Friend function and friend class

### **Operator Overloading**

- Binary Operator Overload
- Unary Operator Overload

### **I/O Streams**

- C++ Class Hierarchy
- File Stream
- Text File Handling
- Binary File Handling
- Error handling during file operations

### **Exception Handling**

- Introduction to Exception.
- Benefits of Exception handling.
- Try and catch block.
- Throw statement.
- Pre-defined exceptions in C++.
- Writing custom Exception class

### **Templates**

- Introduction
- Function Templates
- Class Templates

## Introduction to Python

- What is Language & History of Python.
- Advantages & Disadvantages of Python
- Installing Python
- Python language Environment
- User Interface or IDE
- Writing and executing first python program

## Python Language Fundamentals

- Working with Interactive mode
- Working with Script mode
- Python Character Set
- Python Tokens, Keywords, Identifiers, Literals, Operators
- Variables and Assignments
- Input and Output in Python

## Operators

- Arithmetic Operators
- Relational Operators
- Logical Operators
- Membership Operators
- Identity Operators
- Bitwise Operators
- Assignment Operators
- Operators Precedence
- Evaluating Expression
- Type Casting

## Conditional Statements

- The if Statement
- The if-else Statement
- The if-elif Statement
- Nested if Statements
- Python Indentation

## Looping Statements

- The For Loop
- The While Loop
- Loop else Statement
- Nested Loops
- Break and Continue

## Data Handling

- Standard Data Types
- Numbers
- String Handling
- Python List
- Python Tuple
- Python Set
- Python Dictionary
- Frozen set
- Bool
- Mutable & Immutable

## String Manipulation

- Introduction to Python String
- Accessing Individual Elements
- String Operators
- String Slices
- String Functions and Methods

## List Manipulation

- Introduction to Python List
- Creating List
- Accessing List
- Joining List
- Replicating List
- List Slicing

## Tuples

- Introduction to Tuple
- Creating Tuples
- Accessing Tuples
- Joining Tuples
- Replicating Tuples
- Tuple Slicing

## Dictionaries

- Introduction to Dictionary
- Accessing values in dictionaries
- Working with dictionaries
- Properties

## Set and Frozen set

- Introduction to Set and Frozenset
- Creating Set and Frozenset
- Accessing and Joining
- Replicating and Slicing

## The Range Function

- Introduction to range()
- Types of range() function
- Use of range() function

## Python Functions

- Built-In Functions
  - Introduction to Functions
  - Using a Functions
  - Python Function Types
  - Structure of Python Functions
- User Defined Functions
  - Types of Functions
  - Flow of Execution
  - Arguments and Parameters
  - Default Arguments, Named Arguments
  - Scope of Variables
- Recursion Function
  - Use of recursion function

## Modules and Packages

- Built-in Modules
  - Importing Modules in Python Programs
  - Working with Random Modules
  - E.g. - builtins, os, time, datetime, calendar, sys, etc.
- User Defined Functions
- Structure of Python Modules

## File Input/Output

- Text and Bytes files
- Opening a file
- Reading and Writing Files
- Other File tools
- Array
- Python Numpy

## Adv. Python

- Introduction to Object-Oriented Python
- Creating Your First Class
- Inheritance
- Multiple Inheritance and Method Resolution Order
- Accessing Attributes
- Superclass Methods
- Method Overloading
- Class Attributes
- Static and Class Methods

## Advanced Classes

- Documenting Your Class
- Private Attributes
- Defining Properties
- `__setitem__` and `__getitem__`
- Operator Overloading
- Making a Class Iterable
- Abstract Classes
- Class Decorators
- Class Decorators with Arguments
- MetaClass Programming

## Functional Programming

- Lambdas
- Passing Functions as Parameters
- List Comprehensions
- Nested List Comprehensions
- Map, Reduce, and Filter
- Generators
- Coroutines

## Working with Files

- Reading from Files
- Reading Lines from Files
- Writing and Appending to Files
- File Attributes
- Introduction to Database (MySQL)
- Python Database Connectivity

## Python with GUI (Database Connectivity)

- Introduction to GUI building libraries
- Widgets
- Button
- Canvas
- Checkbutton
- Entry
- Frame
- Label
- Listbox
- Menubutton
- Menu
- Message
- Radiobutton
- Scale
- Scrollbar
- Text
- Toplevel
- Spinbox
- PanedWindow
- LabelFrame
- PHP
- MySQL
- IDE's (eclipse or VS Code)

## Introduction to Java

- What is Language & History of Java
- Feature of Java

## Java Fundamentals & Software's

- JAVA SE
- JDK
- JRE
- Set Path
- JVM

## Structure of Java

- Documentation Section
- Import or Package Section
- Class Section
- main () method section
- Creating First Java Program

## OOPS Implementations

- Features
- Class and Object
- Encapsulation
- Polymorphism
- Abstraction
- Inheritance
- Software Engineer
- Java EE developer



- Data Scientist

## Object Oriented Programming

- Class and Object Declaration
- Methods & Types of Methods
- Passing Object as Method Argument

## Constructors

- What is Constructor?
- Type of Constructor
- Constructor Overloading
- This keyword

## Relationship Between Objects

- By Using Reference Inner Class Concept

## Inheritance

- Single Inheritance
- Hierarchical Inheritance
- Multi-Level Inheritance

## Polymorphism

- Method Overloading
- Method Overriding
- Super Keyword
- Final Keyword

## Abstraction

- Abstract Class
- Abstract Method

## Interfaces Lambda

- What is Interface?
- Declaration Multiple Inheritance

## Basic Programs

- Basic Programs
- Operators & Types

## Packages

- What is Package?
- Steps to implement Package
- Access Protection
- CLASSPATH

## Nested Types

- If, if-else, nested if, else if
- While, do-while, For
- Switch, Break, Continue

## Arrays

- Array Definition
- Single Dimensional Array
- Multi-Dimensional Array

## Command Line Arguments

## Wrapper Classes

- Classes used as wrappers

## Exception Handling

- Definition Types
- Build in Exception
- User Defined Exception

## Working with String

- String Handling Methods
- String Buffer
- String Tokenizer

## Swing (GUI)

- Window Panes
- JFrame, JLabel JText JField, JButton
- JCheckBox JRadioButton, JTable
- Adding Image to JFrame, etc.

## Multithreading

- Thread Lifecycle
- Thread Class Runnable Interface
- Synchronization

## I/O Streams

- File Class I/O Stream
- Hierarchy File Input Stream
- File Output Stream

## Socket Programming

### Reflection

### Extended and Utility Concepts

## Collection Framework

- Examples on Generics HashSet
- LinkedHashSet, Array List, Stack
- Linked List Vector, Hash Map, Queue
- Dequeue Arrays, Date, Calendar
- Date & Time API

## Event Handling & Listeners

- Key Event, Mouse Event
- Listener Key Listeners, Mouse Listeners, Adaptor Listeners

## System Properties and Internationalization(I18N)

## Introduction to MYSQL (Project Based)

### Database programming using JDBC

- Connection
- Statement
- Result Set
- Prepared Statement

## SQL

- SQL Overview
- What is SQL?
- Installing the test environment
- Editors and Platforms to learn SQL

## Complete SQL in a Class

- Introduction
- Quick-start
- Using the basic SELECT statement
- Selecting rows
- Selecting columns
- Counting rows
- Inserting data
- Updating data
- Deleting data
- Import and Export data

## Fundamentals of SQL

- Databases and Tables
- SQL Syntax
- Data Definition
- Data Manipulation
- Data Control
- Transactional Control statements
- Creating tables
- Deleting a table
- Inserting rows into a table
- Deleting rows from a table
- What is NULL?
- Controlling column behaviors with constraints
- Changing a schema with ALTER
- Filtering data with WHERE, LIKE, and IN
- Removing duplicates with SELECT DISTINCT
- Sorting with ORDER BY