Full Stack Front-End Foundations

Duration: 60 hours
Objective: To acquire the knowledge of front end development using HTML, CSS and JavaScript.
Prerequisites: Computer fundamentals and any programming language

Module 1: Introduction to Web

- Brief history of the Internet, How does the Internet work?
- Internet Protocol, Domain Name Service servers
- HTTP Protocol, Web Server vs Application Server
- Architecture of the Web

Module 2: HTML & HTML5

- Introduction to HTML, Basic HTML Tags
- HTML Form & Controls, HTML5: New features in HTML5

Module 3: Cascading Style Sheets (CSS)

- Introduction to CSS, Styling HTML with CSS, Structuring pages with CSS,
- Inline CSS, Internal CSS, External CSS
- CSS Selectors
    - Linking a style to an HTML document
- Responsive Web Design with Bootstrap

Module 4: JavaScript

- Introduction to JavaScript
- Variables in JavaScript, Statements, Operators, Comments, Expressions, and Control Structures
- JavaScript Scopes, Strings, Numbers, Date,Arrays, Array Methods

Module 5: JavaScript

- Objects, Object Definitions, Object Properties, Object Methods, Object Prototypes
- Functions, Function Definitions, Function Parameters, Function Invocation, Function Closures

Module 6: JavaScript

- Document Object Model (DOM)
    - o Object hierarchy in JavaScript
    - o HTML DOM, DOM Elements, DOM Events
    - o DOM Methods, DOM Manipulation, Forms & Forms Validation

Module 7: JSON

- JSON: JavaScript Object Notation (JSON)
    - o Introduction and need of JSON o JSON Syntax Rules
    - o JSON Data - a Name and a Value,
    - o JSON Objects, JSON Arrays, JSON Files, JSON parsing

Module 8: Capstone Project

OOP's Concepts using Core Java

Duration: 60 hours

Objective: To reinforce knowledge of Object Oriented Programming concepts using Core Java.

Prerequisites: Basic knowledge of computer programming.

Module 1:

- Introduction of Java programming language.
- History of Java language, Types of languages.
- Features of Java language.
- Different Editions of Java Language.
- Java Development Tool Kit.
- Java Development Environment Setup.
- Compilation & Execution of a Java Program.
- First Java Program.

Module 2:

- Java Programming Fundamentals.
- Keyword & Identifiers.
- Java Data Types and Literals.
- Variable and Constants.
- Java Comments.
- Java Programming Naming Conventions.
- Programming Indentation Techniques
- Operators
- Java Flow Controls (conditional, looping)

Module 3:

- OOP's Concept
- Class and Object.
- Concept of Encapsulation, Abstraction, Inheritance & Polymorphism
- Class Deceleration.
- Object Construction.
- Data Fields & Methods

Module 4:

- Constructors, initializing reference variables using constructors
- Pass by value v/s pass by reference
- Re-assigning a reference variable
- Passing reference variable to method
- Initializing reference variable of different class
- Heap memory and stack memory

Module 5:

- Inheritance and It's types
- Association, Aggregation and Composition
- Polymorphism: Compile time and runtime polymorphism
- Rules of overriding and overloading of methods
- super and this keywords
- Reference Assignment compatibilities.
- Class Casting Rules

Module 6:

- Abstract class and abstract methods
- Interface (implementing multiple interfaces)
- Object Class: Overriding toString, equals & hashcode method
- Final variables, final methods and final class
- Functional interface
- New interface features (Java 8 & above)

Module 7:

- Access modifiers (public, private, protected and default)
- Packages and import statements
- Static imports
- Constructor chaining (with and without packages)
- Accessing protected variables and methods outside the package

Module 8:

- Introduction to Arrays in JAVA
- Declaring Array Variables & Construction of Array
- Array's Memory Representation
- Initializing an Array – static and dynamic
- Single & Multi-dimensional Arrays
- Anonymous Arrays
- Using methods from java.util.Arrays class
- Method Overloading Issues : using var-args methods

Module 9:

- Garbage collection in java, Requesting JVM to run garbage collection
- Different ways to make object eligible for garbage collection: (Nulling a reference variable, Re-assigning a reference variable & island of isolation)
- Finalize method

Module 10:

- Wrapper classes and constant pools
- String class, StringBuffer & StringBuilder class, String constant pool

Module 11:

- Exception hierarchy, Errors, Checked and un-checked exceptions
- Exception propagation try-catch-finally block, throws clause and throw keyword
- Multi catch block
- Creating user defined checked and unchecked exceptions

Module 12:

- Understanding Streams and stream operation
- Types of Stream – character and Binary streams
- Input and Output Streams, Reader and Writer interfaces
- File Reading writing operations
- Shallow copy and deep copy

Module 13:

- Introduction to collections: Collection hierarchy
- List, Queue, Set and Map Collections
- List Collection: ArrayList, LinkedList
- Collections class,Comparable and Comparator interfaces
- Generics

Module 14:

- MultiThreading : Thread class and Runnable Interface
- sleep, join, yield, setPriority, getPriority methods
- Thread Synchronization, deadlock,Wait, notify and notifyAll methods

Module 15:

- Inner Class (Regular, Method local, Anonymous & static inner class)
- Lambda Expression

Module 16: Capstone Project

Python Programming

Duration: 60 hours

Objective: To reinforce knowledge of Object Oriented Programming concepts using Python. Build the basic foundation for AI & Data Science using Python.

Prerequisites: Basic knowledge of computer programming

Module 01 – Introduction to PYTHON

- A Brief History of Python, How Python is differing from other languages
- Python Version, Installing Python
- IDLE, Getting Help
- How to execute Python program? Writing your first program

Module 02 – Python Basics

- Python Keywords and Identifiers
- Variables and Constants
- Python statements, Comments in python
- Basic Syntax, Printing on screen
- Getting user input -Reading data from keyboard

Module 03 –Data Types & Operators

- Data types: Numbers & Strings
- Operators in Python

Module 04 – Decision Making & Loops

- Control flow and syntax
- The if statement
- The while Loop
- Break and continue
- The for Loop
- Pass statement

Module 05 – Built-in Data Structure in Python

- Lists, Tuples, Sets, Dictionary

Module 06 – Functions

- Introduction to Function, Calling a function, Function arguments
- Built in function vs User Defined Functions
- Scope of variables, Decorators
- Passing function to a function

Module 07 – Modules and Packages

- Introduction to Modules and Packages
- Importing Modules
- Standard Modules- sys, OS etc
- Useful built-in functions
- Packages

Module 08 – Exception Handling

- Introduction to Exception Handling
- Errors, Run Time Errors
- Handling IO Exception
- Try….except statement
- Raise & Assert

Module 09 – File Handling in Python

- Introduction to File Handling in Python
- Files and Directories
- Writing Data to a file, Reading data from a file
- Additional file methods, Working with files
- Working with Directories, The pickle Module

Module 10 – Object Oriented Programming in Python

- Introduction to OOP's
- Classes & Objects
- Creating classes, Instance methods
- Special class method
- Inheritance, Method overriding
- Data hiding

Module 11 – Mathematical Computing using NumPy

- Introduction to NumPy in Python
- Installing NumPy, Creating Arrays using NumPy
- Operations Using NumPy

Module 12 – Data visualization using Matplotlib

- Data Visualization
- Considerations of Data Visualization
- Factors of Data Visualization
- Python Libraries
- Create Your First Plot Using Matplotlib
- Line Properties
- Multiple Plots and Subplots
- Creating different types of graphs for visualization

Module 13 – Data Manipulation with Pandas

- Introduction to Pandas
- Pandas Series & Dataframes
- Operations on Pandas Data
- Importing and exporting data
- Indexing and selecting data

Module 14- **Capstone Project**